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## Action

### *Professional Services Committee*

#### **Adoption of Passing Score Standard for the Teaching Foundations Examination in Science**

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**Executive Summary:** This report describes the standard-setting study process for the Teaching Foundations Examination (TFE) in Science, the results of the studies, and the recommended passing score standard.

**Recommended Action:** That the Commission adopt the recommended the recommended passing score standard for the TFE: Science.

**Presenter:** Phyllis Jacobson, Administrator, and Yvonne Novelli, Assistant Consultant, Professional Services Division

#### **Strategic Plan Goal: 1**

##### **Promote educational excellence through the preparation and certification of professional educators**

- ◆ Sustain high quality standards for the preparation of professional educators.
- ◆ Assess and monitor the efficacy of the Accreditation System, Examination System, and State and Federal Funded Programs.

November-December 2006



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## **Adoption of Passing Score Standard for the Teaching Foundations Examination in Science**

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### **Introduction**

The Teaching Foundations Examination (TFE) in Science is used to satisfy one of the thirteen requirements for the Early Completion Internship Option. The Early Completion Internship Option allows knowledgeable individuals the opportunity to complete a teacher preparation intern program at an accelerated rate. As one of the requirements, the TFE is used in lieu of the teaching foundations and methodology coursework offered in the traditional internship program.

A preliminary study has been performed by the TFE: Science Standard Setting Panel, and their recommended passing score standard will be included in an agenda insert to assist in the Commissioners' review. The procedures employed by the Panel, as facilitated by Educational Testing Service (ETS), to obtain these results are included in this agenda item.

### **Background**

The Teaching Foundations Examinations have been developed for five areas: Multiple Subjects, English, Mathematics, Science, and Social Science. In order to conduct a standard setting study, a minimum of 50 individuals needs to take the specific area examination at a single administration. Even though these examinations were offered numerous times in 2002-2003 and 2003-2004, the examinations were not actually administered due to low registration. With the aid of Senator Scott, the Los Angeles Unified School District, and EDVoice, the TFE in Multiple Subjects, English, and Mathematics were administered in 2004, and passing score standards for these three areas were approved by the Commission. However, fewer than thirty TFE: Science candidates registered so this examination was not administered and a passing score standard was not set at that time.

This past spring and summer, a concerted effort was made to obtain a sufficient number of TFE: Science examinees for the August 5, 2006 administration. This effort was lead by Senator Scott, the Pisces Foundation, and the Commission, with the assistance of the intern community. Ninety examinees took the examination, and ETS was able to facilitate a standard setting study with the TFE: Science Standard Setting Panel. At this time, the examinees from this administration have received their scaled scores but do not know the passing score standard.

### **Teaching Foundations Examination in Science**

As noted above, the TFE: Science is only one of thirteen requirements needed to satisfy the Early Completion Internship Option for the Single Subject Teaching Credential in a science area. Some of the additional requirements are subject-matter competency, a formal recommendation from an approved intern program, and the Teaching Performance

Assessment (TPA), which must be passed on the first attempt. For a complete listing of all Early Completion Internship Option requirements, including a brief history, please see Attachment A, and, for information about the creation of the Teaching Foundations Examinations, see Attachment B.

Passing the TFE: Science waives the equivalent 15 to 20 semester units of teacher preparation coursework that covers teaching methods in science, human development, learning differences and special needs, instructing English learners, reading instruction, assessing student progress, and classroom management techniques. Unless candidates successfully complete all Early Completion Internship Option requirements, this coursework will not be waived and the candidates will need to complete all requirements in the traditional internship program.

Candidates must pass the TFE: Science in its entirety at one test administration. It is a four-hour, pen-and-paper examination that includes two constructed-response questions and fifty multiple-choice questions. The two constructed-response questions address teaching methods in science, with one covering methods in middle school and the other in high school. The multiple-choice questions cover the remaining knowledge listed above. The constructed-response questions comprise two-thirds of the total score and the multiple-choice questions, the remaining one-third. The following chart provides detailed information regarding the specific content found in the TFE: Science.

#### **Content of the TFE: Science**

	<i>TFE: Science Content Categories</i>	<i>Number of Questions</i>	<i>Percentage of Total Score</i>
1	Teaching Methods in Science: Middle/Junior High Level	1 constructed-response	32–33%
2	Teaching Methods in Science: High School Level	1 constructed-response	32–33%
3	Human Development	8–9 multiple-choice	5–6%
4	Learning Differences and Special Needs	8–9 multiple-choice	5–6%
5	Instructing English Learners	8–9 multiple-choice	5–6%
6	Reading Instruction	8–9 multiple-choice	5–6%
7	Assessing Student Progress	8–9 multiple-choice	5–6%
8	Classroom Management Techniques	8–9 multiple-choice	5–6%

#### **TFE: Science Standard Setting Panel Selection**

A TFE: Science standard setting study was conducted in order to provide the Commission with recommendations relevant to the determination of a passing score standard. Commission staff sought nominations of informed California science educators who would perform the study. The Commission received 24 nominations for the panel, of which 17 were recommended to ETS. The nominees consisted of California public school science teachers, induction support providers, and science teacher educators. The science teachers as well as the induction support providers were fully certified in one or

more of the sciences and were familiar with the current California science teacher preparation programs because of their recent experiences mentoring either science student teachers or first-year science teachers. The faculty members, who were from both Commission-approved public and private institutions, either taught methodology for teaching science or supervised science student teachers. The panel members' experience assure that they have practical experience with current teacher training program content and with the knowledge, skills, and abilities needed by beginning science teachers. An effort was also made to select panel members who were geographically diverse, representing all parts of the state. Another consideration was to include teachers who represented the ethnic and racial makeup of California while maintaining a gender balance reflecting the California teaching population. Appendix C lists the aggregate information for the panel members who were able to participate.

### **Standard Setting Procedures**

The TFE: Science standard setting was conducted in Sacramento, California, on October 24, 2006, with 13 of the invited panel members able to attend. Prior to the meeting, ETS sent panel members review materials that included a summary agenda, overview of the standard setting procedure, and a copy of the *Test at a Glance* for TFE: Science, which describes the test content, format, scoring ratio, and scoring rubrics, and also provides sample test questions. This allowed members adequate time to become familiar with the examination prior to the meetings.

The standard setting study began with an overview of the requirements for the Early Completion Internship Option so the panel members understood the role of the TFE: Science. ETS staff discussed the purpose of the standard setting study and the test development process used to create the TFE: Science. This was followed by a review of the test specifications and scoring rubric used for the four parts of each of the constructed-response items, with the members simulating the testing experience by individually responding to the test questions found on the exam. The members were asked to consider their own exam responses in light of their current level of training and experience and compare it to what their answers would have been when they were a beginning teacher. The meeting continued with a discussion defining the sufficiently knowledgeable, entry-level teacher, which is the population that might be expected to pass the exam. They then moved into small groups to discuss the scores that might be given for a minimally acceptable response to each of the four parts of the constructed-response questions in light of the scoring rubric, found in Appendix D, and the benchmark responses taken from the August 5, 2006 administration. Each group presented its suggested minimum raw scores and rationale for those scores, which generated a discussion by the entire panel. After instruction on the totaling and weighing process used for the raw scores, the panel members were asked to independently recommend raw scores for each part of all constructed-response items and then mathematically weigh and total the scores. They were then given the chance to independently adjust their total score if they felt it was either too high or too low. These final scores were later averaged by ETS to establish the minimum weighted score that the panel members felt an entry-level teacher would obtain for the constructed-response items found on the August 5, 2006 test form.

Before beginning the standard setting study for the multiple-choice portion of the TFE, ETS staff again reviewed the meaning of a “sufficiently knowledgeable, entry-level teacher” and discussed how to determine the knowledge-level estimation of a multiple-choice question. For training on this, panelists were given simulated multiple-choice items and asked, if 100 sufficiently-trained entry-level teachers responded to the question, what percentage *would* be able to answer it correctly. Following this, they discussed the knowledge-level estimation of five multiple-choice items from the August 5, 2006 form, and the panelists were asked to independently judge each of the 50 items. ETS used this information to later tabulate the panel members’ recommendations regarding the multiple-choice questions.

As a last task, the panelists were asked to validate the test topics. As a group, they discussed the validity of five multiple-choice questions by considering if a first-year teacher *should* know the topic. Then, the panel members independently judged each of the 50 multiple-choice items, determining if the question topic was very important, important, slightly important, or not important. They were then asked to judge, using the very-important to not-important scale, if a first-year teacher should know the seven main topics covered in the examination and required by SB 57.

### **Standard-Setting Panel Recommended Passing Score Standard**

Following the standard-setting study, ETS calculated the median score from each of the panel members’ recommendations for the test form used on August 5, 2006. A chart, which will be displayed in the agenda insert, will indicate the number of scorable items by item type, the maximum raw score by item type, the panel members’ recommended weighted raw score by the item type and the total, and their recommended scaled score, with a reporting scale-range from 100 to 200.

The standard error of measurement on a test is a measure of the “spread” of scores that an individual student would receive if the student had been tested repeatedly, assuming the student had not studied or contemplated the answers between tests. Fortunately, an individual does not need to be continuously tested because the standard error of measurement may be derived from the scores of a number of students testing at a single administration. An additional chart in the agenda insert will give the range of scores with various estimated standard errors of measurements based on the TFE: Science panel members’ recommended score. It will also indicate the percentage of examinees that will pass the August 5, 2006 administration using those scores as the minimum for passing.

### **Recommended Passing Score Standard**

The TFE: Science passing score standard will be found in the agenda insert. This score will be based on the TFE: Science test form that was administered on August 5, 2006.

Staff also recommends that the Commission allow ETS to use the passing score standard adopted by the Commission to equate to all future TFE: Science test forms.

As soon as possible after the Commission's decision, the passing score standard will be placed on the Commission's internet site and distributed through coded correspondence and the Commission's list-serve. The August 5, 2006 TFE: Science examinees will be notified by mail, also as soon as possible.

## **Appendix A**

### **Establishment and Implementation of the Early Completion Internship Option**

The Early Completion Internship Option allows knowledgeable individuals who qualify for and are admitted in to a Commission-approved multiple and single subject intern program the opportunity to complete the program at an accelerated rate. This was established with the passage of Senate Bill 57, (Scott, Chapter 269, Statutes of 2001), which resulted in Education Code §44468. Under this accelerated option, college and university internship program and district intern program candidates verify their knowledge of state standards for educational foundations and subject-specific pedagogy as well as their practical skills by passing assessments rather than through coursework and practicum. These assessments along with numerous other requirements for the Early Completion Internship Option are noted below.

The requirements that must be met prior to enrollment in the Early Completion Intern Option program are the following:

1. A baccalaureate degree,
2. Passage of the California Basic Educational Skills Test (CBEST),
3. Passage of the Teaching Foundations Examination (TFE),
4. U.S. Constitution,
5. Subject-matter competency,
6. Offer of employment in an intern position,
7. Verification of professional fitness, and
8. Enrollment in a district intern program or a college or university internship program.

In addition to one through eight above, the following must also be satisfied in order to obtain a preliminary Multiple Subjects or Single Subject Teaching Credential:

9. Passage of the Teaching Performance Assessment (TPA) on the first attempt,
10. Passage of the Reading Instruction Competence Assessment (RICA) (for Multiple Subject Credential candidates only),
11. Demonstration of foundational computer technology,
12. Any other instruction not covered by the TFE that the recommending institution deems necessary for the preparation of the candidate, and
13. Formal recommendation by their district intern program or college or university internship program.

## Appendix B

### Creating the Teaching Foundations Examination

The Teaching Foundations Examination, one of the thirteen requirements for the Early Completion Internship Option, was created in 2002, through the work of the Commission, a panel of California experts, and Educational Testing Service (ETS). Initially, ETS created a prototype using their available pedagogical testing items for Multiple Subjects, English, Mathematics, Science, and Social Science. The Commission then assembled panels comprising of elementary and secondary teachers, teaching preparation faculty, and K-12 administrators to review the prototype and modify it to comply with the stated requirements in Senate Bill 57, other state requirements, and Commission-approved SB 2042 program requirements. Each examination includes knowledge of the following prescribed areas found in SB 57:

- Human development
- Learning differences and special needs
- Instructing English learners
- Assessing student progress
- Classroom management techniques
- Reading instruction
- Teaching methods in the specific area

#### *The Number of TFE Examinations Administered with the Passing Rates*

<b>Teaching Foundations Examination</b>	<b>2003-2004</b>		<b>2004-2005</b>		<b>2005-2006</b>	
	<i>number of exams taken</i>	<i>number passed (% passed)</i>	<i>number of exams taken</i>	<i>number passed (% passed)</i>	<i>number of exams taken</i>	<i>number passed (% passed)</i>
TFE: Multiple Subjects	183	111 (61%)	7	7 (100%)	45	40 (89%)
TFE: English	70	44 (63%)	5	8 (89%)	30	24 (80%)
TFE: Mathematics	59	21 (42%)	9	3 (60%)	23	18 (78%)

## Appendix C

### Composition of the Standard Setting Panel for the Teaching Foundations Examination in Science

<i><b>TFE: Science Standard Setting Panel</b></i>	<i><b>Composition</b></i>
Total Number of Participants	13
<b>Years of Experience Teaching Science (K-12)</b>	
0-7	2
8-11+	11
<b>Years of Mentoring Experience</b>	
0-7	10
8-11+	3
<b>Employment</b>	
District	5
County	1
University of California	1
California State University	4
Private Institution	2
<b>Region</b>	
North	7
South	6
<b>Population of District, County, or Institution</b>	
Less than 3,000	1
3,000-10,000	2
10,001-100,000	9
Over 100,000	1
<b>Race and Ethnicity</b>	
African American or Black	1
American Indian or Alaska Native	0
Asian, Asian American, or Pacific Islander	1
Mexican or Mexican American	0
Other Hispanic, Latino, Latin American, or Puerto Rican	0
White	9
Other/declined to state	3
<b>Gender</b>	
Female	10
Male	2
Declined to state	1

## Appendix D

### Scoring Rubrics for the TFE: Science Constructed-Response Questions

There are two constructed-response questions on the Teaching Foundations Examination (TFE) in Science. Both address teaching methods, each at a different grade level. Both questions have four parts, with the first part asking the examinee to describe an instructional sequence (lesson plan) for helping the class meet a specified learning goal. The remaining three parts ask the examinee to give more details and the rationale for choosing the teaching methods the examinee described in part one.

#### Scoring Rubric for the First Part of Each Constructed-Response Item

The following scoring rubric, zero to four, is used to evaluate the first part of each question, which asks the examinee to describe an instructional sequence (lesson plan) for helping a class meet a specified learning goal.

##### **Score of 4—The response is characterized by most or all of these statements.**

- The response contains clear and appropriate answers to all parts of the question.
- The instructional activities flow in a logical sequence that makes sense in relation to the student learning goal.
- The instructional activities are appropriate for the given grade level.
- The response demonstrates a strong understanding of the subject matter and pedagogy required by the question.
- The response contains a sufficient number of well-chosen and appropriate examples and supporting details.

##### **Score of 3—The response is characterized by most or all of these statements.**

- The response contains clear and appropriate answers to most parts of the question.
- The instructional activities flow in an acceptable sequence in relation to the student learning goal.
- The instructional activities are appropriate for the given grade level.
- The response demonstrates an adequate understanding of the subject matter and pedagogy required by the question.
- The response contains some appropriate examples and supporting details.

##### **Score of 2—The response is characterized by most or all of these statements.**

- The response contains appropriate answers to some parts of the question.
- The instructional activities do not flow in a logical sequence that makes sense in relation to the student learning goal.
- Some of the instructional activities are appropriate for the given grade level but some are clearly inappropriate.
- The response demonstrates an incomplete understanding of the subject matter and pedagogy required by the question.
- The response contains few appropriate examples and supporting details.

##### **Score of 1—The response is characterized by most or all of these statements.**

- The response contains appropriate answers to few parts of the question.
- The instructional activities do not flow in a logical sequence that makes sense in relation to the student learning goal.

- The instructional activities are, for the most part, inappropriate for the given grade level.
- The response demonstrates a weak understanding of the subject matter and pedagogy required by the question.
- The response contains no appropriate examples or supporting details.

**Score of 0**

- The response contains no strategies, approaches, examples, or details that are appropriate to the question.

**Scoring Rubric for the Second, Third, & Fourth Parts of Each Constructed-Response Item**

The following scoring rubric, zero to two, is used to evaluate the second, third, and fourth parts of each question, which asks the examinees to give more details about and explain one of their choices of teaching strategies.

**Score of 2—The response is characterized by most or all of these statements.**

- The reason(s) for choosing the approach taken is(are) appropriate and clearly stated.
- The details of the approach taken are clearly described and appropriate for the learning goal, grade level, and teaching situation.
- The response makes clear connections between theory and practice, as appropriate, in its justification for choosing the approach taken.
- The response demonstrates a strong understanding of the issue addressed in the question.
- The response addresses all parts of the question.

**Score of 1—The response is characterized by most or all of these statements.**

- The reason(s) for choosing the approach taken is(are) acceptable.
- The details of the approach taken are adequately described and mostly appropriate for the learning goal, grade level, and teaching situation.
- The response may contain no explicit connections between theory and practice in its justification for choosing the approach taken.
- The response demonstrates a basic understanding of the issue addressed in the question.
- The response adequately addresses at least one part of the question.

**Score of 0**

- The response contains no reasons, examples, details, or connections that are appropriate to the question.